

## **REMARKS**

The Applicants thank the Examiner for the careful consideration of this application. The Office Action dated September 2, 2009 has been received and its contents carefully considered. Claims 1-55, 58, 60, and 62-65 are currently pending in this application. Based on the foregoing amendments and the following remarks, the Applicant respectfully requests that the Examiner reconsider all outstanding rejections and that they be withdrawn.

### **Final Rejection – Premature**

The Final Office Action issued September 2, 2009 repeats rejections which should have been withdrawn, as discussed below. The Office Action has, therefore, been made final prematurely. To advance prosecution, however, Applicants have filed a Request for Continued Examination with these remarks. Applicants request the reconsideration of the rejections in view of these remarks, and request that any rejections or arguments, if issued, be presented in a Non-Final Office Action.

### **Claim Rejection - 35 U.S.C. §103(a)**

As discussed in more detail below, in an attempt to formulate an obviousness rejection, the office action relies on information that is asserted to be “well known” in the art. For example, the office action states that “[i]t is well known in the art that the catalyst complex taught by Iverson et al. may be employed in other reactions, including *inter alia*, hydroformylation reactions” and “[i]t is well-known in the art that the catalyst complex taught by Hofmann et al. may be employed in other reactions, including, *inter alia*, hydroformylations reactions.” These statements are unsupported by anything other than conclusory statements by the Examiner and are insufficient to establish *prima facie* obviousness. Applicants submit that, if such information is so well known, there should be references available demonstrating such a fact. However, in multiple rounds of prosecution, the Examiner has been unable to demonstrate such a fact in spite of Applicants' repeated assertions. Applicants submit that the office action still fails to establish that the present claims are *prima facie* obvious.

The MPEP (2144.03) states "[w]hile "official notice" may be relied on, these circumstances should be rare when an application is under final rejection or action under 37 CFR 1.113. Official notice unsupported by documentary evidence should only be taken by the examiner where the facts asserted to be well-known, or to be common knowledge in the art are capable of instant and unquestionable demonstration as being well-known" (emphasis added). The Examiner has not met this burden.

The Office Action also makes several assertions regarding making particular choices for substitutions and that it would be "obvious to try" a number of combinations. However, given the unpredictability in the art this standard can not be applied. Any obviousness assertion requires some degree of predictability. ("Obviousness does not require absolute predictability, however, at least some degree of predictability is required.") MPEP 2143.02; "An 'obvious to try' rationale may support a conclusion that a claim would have been obvious where one skilled in the art is choosing from a finite number of identified, predictable solutions, with a reasonable expectation of success." MPEP 2145.) There is no reason, other than hindsight, that one of ordinary skill would "try" the combinations suggested by the Examiner, no teaching of any method for predicting selectivity or reactivity, and therefore, no reasonable expectation of success or predictable result. Accordingly, the claims have not been shown to be *prima facie* obvious and the rejections must be withdrawn.

### Iverson et al.

On pages 2-3, the Office Action rejects claims 58 and 60 under 35 U.S.C. § 103(a) as allegedly unpatentable over Iverson et al. (*Organometallics*, 2001). Iverson et al. describe the functionalization of biphenylene using a bidentate rhodium catalyst system. The catalyst system is used to functionalize biphenylene with alkenes and alkynes. The catalyst described by Iverson et al. does not have the structure required by claim 58, and offers no reason to modify the structure of the catalyst. None of the reactions described by Iverson et al. involve hydrogen. None of the reactions described by Iverson et al. are hydroformylation reactions. The Examiner concludes "[i]t is well known in the art that the catalyst complex taught by Iverson et al. may be employed in other reactions, including *inter alia*, hydroformylation reactions."

Applicants respectfully assert that if the catalyst system described by Iverson et al. is well known for use in hydroformylation reactions, or other reactions using hydrogen, there must be an available reference demonstrating this fact. The Examiner should have presented such references at the outset (since the claims are directed to hydroformylation catalysts) or at the very least, in response to Applicants reply to the non-final Office Action. To assert that these alternate uses are "well-known" to the point that no references are required is inappropriate and the present rejection can not be sustained. Applicants request that any such references, if known, be cited in a new, non-final Office Action. In the absence of such a demonstration, Applicants submit that the rejections must be withdrawn.

### **Hofman et al.**

On pages 3-4, the Office Action rejects claim 58 under 35 U.S.C. § 103(a) as allegedly unpatentable over Hofmann et al. (*Journal of Organometallic Chemistry*, 1995). Hofmann et al. describes hydrosilylation reactions using a catalyst system using a bidentate rhodium catalyst system. The rhodium catalyst described by Hofmann et al. does not have the structure required by claim 58, as acknowledged by the Examiner. There is no reason, based on the teachings of Hofmann et al., to modify the structure of the catalyst system. The reaction described by Hofmann et al. is not a hydroformylation reaction. The reaction described by Hofmann et al. does not use hydrogen. Given the teaching by Hofmann et al. there is no reason to use the catalyst with hydrogen, or for hydroformylation.

The Examiner states on page 4, "[i]t is well-known in the art that the catalyst complex taught by Hoffmann et al. may be employed in other reactions, including, inter alia, hydroformylations reactions." Applicants disagree. As discussed above, if the catalyst system by Hofmann et al. were so well known to be used in hydroformylation reactions, or other reactions using hydrogen, the Examiner should have presented such references at the outset (since the claims are directed to hydroformylation catalysts), or at the very least, in response to Applicants' reply to the non-final Office Action. To assert that these alternate uses are "well-known" to the point that no references are required is inappropriate and the present rejection can not be sustained. Applicants request that

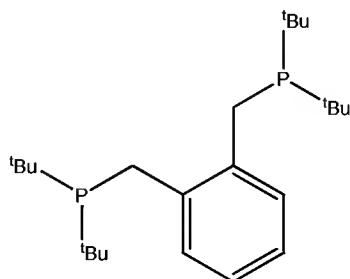
any such references, if known, be cited in a new, non-final Office Action. In the absence of such a demonstration, Applicants submit that the rejections must be withdrawn.

**Breikss et al. and Eastham et al.**

On pages 4-5, the Office Action rejects claims 1, 2, 4-41, 44-47, 51-55, 60, and 62-65 under 35 U.S.C. § 103(a) as allegedly unpatentable in view of Breikss et al. (US 5,710,344) and Eastham et al. (US 6,335,471). Applicants disagree.

Breikss et al. teach a process for preparing linear aldehydes by hydroformylation of ethylenically unsaturated organic compounds in the presence of a specific group VIII metal and a bidentate organic ligand. Breikss et al. further teaches in column 1, lines 17-21, "the selection of the catalyst for the hydroformylation reaction has an influence on the rate and selectivity of the product aldehyde(s), but that there is **no method for predicting selectivity or reactivity** from the structure of a catalytic species."

First, the Examiner asserts on page 6 that Eastham et al. teach a ligand wherein the bridging group corresponding to "R" is an alkylene group. The Examiner points to the compound bis(di-tertbutylphosphino)-o-xylene, stating that the bridging group (R) is a methylene group. Applicants point out that the compound bis(di-tertbutylphosphino)-o-xylene (shown below for clarity), has **xylene** as the bridging group; xylene is not methylene nor an alkylene group. Thus, the combination of Breikss et al. and Eastham et al. fails to teach or disclose all of the features of claims 55 and 63. The rejection of these claims should be withdrawn for at least this reason.



Further, Breikss et al. clearly teaches oxygen as the linking group linking phosphorous to an aryl bridging group. Breikss et al. further teaches that the substituents on the phosphorous are aryl or nitrogen containing heterocyclic groups (column 2, lines 15-35). The claims are directed to a

lower alkylene linking group which may be linked at available adjacent carbon atoms of an aryl bridging group. The bridging groups of Breikss are not linked at adjacent positions of the linking group and are linked via an oxygen and not a lower alkylene. Still further the Q (phosphorous) atom of the claims is linked to two tertiary carbon atoms whereas Breikss et al. does not teach such tertiary carbon atoms. On the contrary, the Breikss disclosure does not even teach this as a possibility, being limited to aryl or nitrogen heterocycles joined to the phosphorus – see definition of R3 and R4. Therefore, it is simply not possible for Breikss to encompass tertiary carbon atoms joined to the phosphorus atom. Still further, Breikss et al. is clearly in the field of organic dihydroxyl bridging groups. The Examiner has provided no reason why the skilled person would abandon these core teachings of Breikss of organic dihydroxyl bridging groups and the P-N or P-Ar bonds and replace them with the bridging group of Eastham or the tertiary carbon groups of Eastham. Therefore, there are several differences in the respective ligands that are required by the claims and simply not disclosed in Breikss. It is not tenable that the skilled person would see the bidentate ligands of Eastham as analogous to Breikss and see them as an alternative ligand and then select the halide compounds too.

The Examiner acknowledges that Breikss et al. does not describe the bidentate ligand required by the claims. The Examiner further asserts that it would be obvious "to include ligands taught by Eastham et al. as "**possible alternatives**" to the bidentate ligands taught by Breikss et al. in order "**to experiment**" and find the best metal-ligand combination. Breikss et al. describes not just hydroformylation, but highly linear hydroformylation reactions. Given the different structures between the compounds of Breikss et al. and the compounds of Eastham et al. and the teaching by Breikss et al. that there is **no method for predicting selectivity or reactivity** from the structure of a catalytic species, it would be unreasonable to expect success by combining the Group VIII metals from Breikss et al. with the bidentate phosphine ligands described by Eastham et al. As stated above, "at least some degree of predictability is required" in formulating an obviousness rejection. For this reason at least, the rejections should be withdrawn.

Furthermore, the Examiner's "obvious to try" argument is improper. The Examiner acknowledges on page 6 that Eastham et al. describe only a subset of an essentially unlimited number of ligands that may function as carbonylation catalysts. The Examiner then asserts that it

would have been "obvious to try" the ligands disclosed by Eastham et al. in the process described by Breikss et al. even though there are an essentially infinite number of known ligands, many having closer structural similarity to the ligands described by Breiss et al. than the ligands described by Eastham et al. Breikss et al. provides no reason to alter the ligands, and the Examiner provides no further reasons beyond "**to experiment**" and find the best metal-ligand combination. There is no reason, other than hindsight, that one of ordinary skill would "try" the ligands described by Eastham et al. in the process of Breikss et al. Furthermore, given Breikss et al. teaching that there is **no method for predicting selectivity or reactivity** from the structure of a catalytic species, there is no reasonable expectation of success or predictable result. For this reason, the rejections based on Breikss et al. and Eastham et al. should be withdrawn.

Still further, the Examiner has not disclosed why one of skill in the art would select only the halogen containing metal compounds described by Breikss et al. for the catalyst. As discussed previously, Group VIII metal halides are mentioned in column 6 of Breikss. However, there is no reference to metal halides or halogenated solvents in the examples. One of ordinary skill must do more than combine Breikss et al. with Eastham et al. in a hydroformylation reaction (which, for the reasons stated above one would not do) because the person of ordinary skill must also select the halogenated group VIII metal compounds from Breikss. There is no reason or teaching in either document why this is advantageous. Furthermore, it is not exemplified in Breikss at all. The Examiner has not explained why the skilled person would select a halo group VIII metal compound from Breikss et al. when combining with Eastham et al. There is no teaching of the advantage in selectivity that is found when this is done.

In contrast, Applicants have shown that when a halogen containing group VIII metal compound is used, significant improvements in linear selectivity are evident. The Examiner has not addressed this result. This result is unexpected in view of Breikss et al. or Eastham et al. The teaching by Breikss et al. that there is **no method for predicting selectivity or reactivity** from the structure of a catalytic species means there is no predictability that a particular metal-ligand combination will work (have reactivity), or that a particular metal-ligand combination will produce improved linear:branched ratios (selectivity). For this reason, at least, the rejections should be withdrawn.

### Conclusion

All of the stated grounds of rejection have been properly traversed, accommodated, or rendered moot. Applicant therefore respectfully requests that the Examiner reconsider all presently outstanding rejections and that they be withdrawn. Applicant believes that a full and complete reply has been made to the outstanding Office Action and, as such, the present application is in condition for allowance. If the Examiner believes, for any reason, that personal communication will expedite prosecution of this application, the Examiner is hereby invited to telephone the undersigned at the number provided.

The Commissioner is authorized to charge any deficiency in any patent application processing fees pursuant to 37 CFR § 1.17, including extension of time fees pursuant to 37 CFR § 1.17(a)-(d), associated with this communication and to credit any excess payment to Deposit Account No. 22-0261.

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Respectfully submitted,

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